AC air conditioner
communication protocol

Suzhou Langji Technology Co.,Ltd

Contents

1.   Introduction

This protocol describes the protocol for command control and data exchange between air conditioner and monitoring module. The prescribed functions mainly include:

1> The host computer obtains the relevant information of air conditioner by sending the read command;

2> The host computer sets related parameters and action control by writing commands.

2. Application Layer

2.1 Transmission Mode

Standard MODBUS RTU communication protocol is adopted.

2.2 Function Code

This protocol supports the following function codes:

Command Code	Description
0x01	Read coils
0x02	Read discrete inputs
0x03	Read holding registers
0x04	Read input register
0x10	Write multiple registers
0x06	Write single register

2. 3 Error Code

Error Code	Definition	Meaning
0x01	Illegal function	The function code received in the query is not an allowable action for the server(or slave).
0x02	Illegal data address	The data address received in the query is not an allowable address for the device.
0x03	Illegal data value	A value contained in the query data field is not an allowable value for device.
0x04	Slave device failure	An unrecoverable error occurred while the device was attempting to perform the requested action.
0x06	Slave device busy	Device is engaged in processing a long-duration program command
0x0C	CRC check failure	CRC check failure

The slave exception response format is as follows:

No.	0	1	2	3	4
Definition	ADDR	CMD +128	ErrCode	LSB	MSB
Description	Address	+128 Command+128	Error Code	CRC check	

3. Coil Register

3.1 Communication format

Format of data sent by the master

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x01	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Start register addr.		Register number. n		CRC check	

Format of the normal response data from the slave

No.	0	1	2	3	4	…	L+2	L+3	L+4
Definition	ADDR	0x01	Length	Data1	Data2	…	DataL	LSB	MSB
Description	Address	Command	Number of sent bytes: L	Register value: Each byte contains 8 states, the low bit is the low address state, and the high bit is the high address state				CRC check	

Note：L=n/8；If n is a multiple of 8: L=n/8
L=n/8+1; If n is not a multiple of 8: L=n/8+1

3.2 Data List

No.	Parameter	Address	Data type	Note
1	Machine state	0x0000	Bit	1:Runing 0:Stop
2	Self-check state	0x0001	Bit	1:Runing 0:Stop
3	Cooing state	0x0002	Bit	1:Runing 0:Stop
4	Heating state	0x0003	Bit	1:Runing 0:Stop
5	Internal fan state	0x0004	Bit	1:Runing 0:Stop
6	External fan state	0x0005	Bit	1:Runing 0:Stop
7	Dehumidification state	0x0006	Bit	1:Runing 0:Stop
8	Hydrogen discharging state	0x0007	Bit	1:Runing 0:Stop
9	Dry contact alarming state	0x0009	Bit	1:Alarm 0:Normal

4. Discrete Input Register

4.1 Communication format

Format of data sent by the master

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x02	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Start register addr.		Register number: n		CRC check	

Format of the normal response data from the slave

No.	0	1	2	3	4	…	L+2	L+3	L+4
Definition	ADDR	0x02	Length	Data1	Data2	…	DataL	LSB	MSB
Description	Address	Command	L Number of sent bytes: L	Register value: each byte contains 8 states, the lower bit is the lower address state Register data bits				CRC 校验 CRC check	

Note：L=n/8；If n is a multiple of 8: L=n/8
: L=n/8+1; If n is not a multiple of 8: L=n/8+1

4.2 Data List

No.	Parameter	Address	Data type	Note
1	Return air temp. sensor fault	0x0000	Bit	1: alarm; 0: normal
2	Condenser temp. sensor fault	0x0001	Bit	1: alarm; 0: normal
3	Outdoor temp. sensor fault	0x0002	Bit	1: alarm; 0: normal
4	Indoor humidity sensor fault	0x0003	Bit	1: alarm; 0: normal
5	Compressor underload alarm	0x0004	Bit	1: alarm; 0: normal
6	Compressor overload alarm	0x0005	Bit	1: alarm; 0: normal
7	Heater underload alarm	0x0006	Bit	1: alarm; 0: normal
8	Heater overload alarm	0x0007	Bit	1: alarm; 0: normal

9	Internal fan alarm	0x0008	Bit	1: alarm; 0: normal
10	External fan alarm	0x0009	Bit	1: alarm; 0: normal
11	High pressure alarm	0x000A	Bit	1: alarm; 0: normal
12	Low pressure alarm	0x000B	Bit	1: alarm; 0: normal
13	Inside high temperature alarm	0x000C	Bit	1: alarm; 0: normal
14	Inside low temperature alarm	0x000D	Bit	1: alarm; 0: normal
15	Outside high temperature alarm	0x000E	Bit	1: alarm; 0: normal
16	Outside low temperature alarm	0x000F	Bit	1: alarm; 0: normal
17	External input alarm	0x0011	Bit	1: alarm; 0: normal
18	Evaporator temp. sensor fault	0x0014	Bit	1: alarm; 0: normal
19	High humidity alarm	0x0015	Bit	1: alarm; 0: normal
20	Low voltage alarm	0x0016	Bit	1: alarm; 0: normal
21	High voltage alarm	0x0017	Bit	1: alarm; 0: normal
22	Inverter compressor fault	0x0018	Bit	1: alarm; 0: normal
23	Freezing alarm of evaporator	0x001B	Bit	1: alarm; 0: normal
24	Frequent high pressure alarm	0x001C	Bit	1: alarm; 0: normal
25	Frequent low pressure alarm	0x001D	Bit	1: alarm; 0: normal
26	High condenser temp. alarm	0x001E	Bit	1: alarm; 0: normal
27	Refrigerant leak alarm	0x001F	Bit	1: alarm; 0: normal
28	Inverter compressor communication fault	0x0020	Bit	1: alarm; 0: normal

5. Input Register

5.1 Communication format

Format of data sent by the master

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x04	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Start register addr.		Register number: n		CRC check	

Format of the normal response data from the slave

No.	0	1	2	3	4	5	6	…	L+1	L+2	L+3	L+4
Definition	ADDR	0x04	Length	MSB	LSB	MSB	LSB	…	MSB	LSB	LSB	MSB
Description	Address	Command	Number of sent bytes: L=n*2	Register 1		Register 2		…	Register n		CRC check	

5.2 Data List

No.	Parameter	Unit	Address	Data type	Note
1	Return air temperature	℃	0x0000	2 bytes signed integer	Data=Actual value*10
2	Condenser temperature	℃	0x0001	2 bytes signed integer	Data=Actual value*10
3	Compressor/Heater current	A	0x0002	2 bytes unsigned integer	Data=Actual value*100
4	Internal fan current	A	0x0003	2 bytes unsigned integer	Data=Actual value*100
5	External fan current	A	0x0004	2 bytes unsigned integer	Data=Actual value*100
6	AC power voltage	V	0x0005	2 bytes unsigned integer	Data=Actual value*10
7	External temperature	℃	0x0006	2 bytes signed integer	Data=Actual value*10
8	Internal humidity	%	0x0007	2 bytes unsigned integer	Data=Actual value*10

9	Evaporator temperature	℃	0x0008	2 bytes signed integer	Data=Actual value*10
10	Internal fan speed	RPM	0x0009	2 bytes unsigned integer	Data=Actual value
11	External fan speed	RPM	0x000A	2 bytes unsigned integer	Data=Actual value
12	Inverter compressor speed	RPM	0x000B	2 bytes unsigned integer	Data=Actual value

6. Holding Register

6.1 Communication Format

6.1.1 Read Register

：**Format of data sent by the master**

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x03	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Start register addr.		Register number n		CRC check	

从节点正常应答帧格式：**Format of the normal response data from the slave**

No.	0	1	2	3	4	…	L+1	L+2	L+3	L+4
Definition	ADDR	0x03	Length	MSB	LSB	…	MSB	LSB	LSB	MSB
Description	Address	Command	Send number L=n*2	Register 1		…	Register n		CRC check	

6.1.2 Write Single Register

Format of data sent by the master

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x06	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Register address		Data		CRC check	

Format of the normal response data from the slave

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x06	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Register address		Data		CRC check	

6.1.3 Write Multiple Registers

Format of data sent by the master

No.	0	1	2	3	4	5	6	7	8	...	L+5	L+6	L+7	L+8
Definition	ADDR	0x10	MSB	LSB	MSB	LSB	Length	MSB	LSB	...	MSB	LSB	LSB	MSB
Description	Address	Command	Start register address		Number: n		L = n*2 Send number	Register 1		...	Register n		CRC check	

Format of the normal response data from the slave

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x10	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Start register address		Register number		CRC check	

6.2 Register List

No.	Parameter	Unit	Address	Data type	Note
1	Compressor starting temperature	℃	0x0000	2 bytes signed integer	Data=Actual value*10
2	Compressor stop return difference temperature	℃	0x0001	2 bytes signed integer	Data=Actual value*10
3	Heater starting temperature	℃	0x0002	2 bytes signed integer	Data=Actual value*10
4	Heater stop return difference temperature	℃	0x0003	2 bytes signed integer	Data=Actual value*10
5	Cabinet inside high temperature limit	℃	0x0004	2 bytes signed integer	Data=Actual value*10

6	Cabinet inside low temperature limit	℃	0x0005	2 bytes signed integer	Data=Actual value*10
7	Dehumidification start humidity	%	0x0006	2 bytes unsigned integer	Data=Actual value*10
8	Dehumidification difference humidity stop return	%	0x0007	2 bytes unsigned integer	Data=Actual value*10
9	High humidity alarm value	%	0x0008	2 bytes unsigned integer	Data=Actual value*10
10	Dehumidification enable	/	0x0009	2 bytes unsigned integer	Data=Actual value*10
11	Internal fan state in standby mode	/	0x000D	2 bytes unsigned integer	0- Stop; 1-Run
12	Communication baud rate	bps	0x000E	2 bytes unsigned integer	0-4800; 1-9600; 2-19200; 3-38400
13	External alarm option	/	0x000F	2 bytes unsigned integer	Data=Actual value
14	Hydrogen discharging working time	Minute	0x0010	2 bytes unsigned integer	Data=Actual value
15	Hydrogen discharging interval	Hour	0x0011	2 bytes unsigned integer	Data=Actual value
16	High voltage alarm value	V	0x00012	2 bytes unsigned integer	Data=Actual value*10
17	Low voltage alarm value	V	0x00013	2 bytes unsigned integer	Data=Actual value*10
18	Communication address	/	0x00014	2 bytes unsigned integer	Data=Actual value

7. Write Single Coil

7.1 Communication Format

Format of data sent by the master

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x05	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Register address		Data		CRC check	

Format of the normal response data from the slave

No.	0	1	2	3	4	5	6	7
Definition	ADDR	0x05	MSB	LSB	MSB	LSB	LSB	MSB
Description	Address	Command	Register address		Data		CRC check	

7.2 Register List

No.	Parameter	Data	Address	Date type
1	Remote turn on/off air conditioner	0xFF00 ON 0x0000 OFF	0x0000	2 bytes unsigned integer
2	Self-checking function	0xFF00 ON 0x0000 OFF	0x0001	2 bytes unsigned integer
3	Force cooling	0xFF00 ON 0x0000 OFF	0x0004	2 bytes unsigned integer
4	Force heating	0xFF00 ON 0x0000 OFF	0x0005	2 bytes unsigned integer
5	Discharge of hydrogen	0xFF00 ON 0x0000 OFF	0x0007	2 bytes unsigned integer
6	Restore default	0xFF00	0x0008	2 bytes unsigned integer
7	Alarm reset	0xFF00	0x000B	2 bytes unsigned integer